

CLAIMS

1. An exposure apparatus which transfers a pattern image formed on a mask on to a substrate through a projection optical system, comprising:

5           a substrate table which holds said substrate;  
          a first sensor which measures a gap between said substrate surface held by said substrate table and a control target position; and

10           a second sensor which measures a distance between said projection optical system and said substrate table in an optical axis direction and corrects the control target position of said first sensor.

15           2. The exposure apparatus according to claim 1, wherein said second sensor measures a change amount of the distance between said projection optical system and said substrate table in the optical axis direction and corrects the control target position of said first sensor based on the change amount.

20           3. The exposure apparatus according to claim 2, wherein said second sensor measures a change amount of the distance between a position near said first sensor of said projection optical system and said substrate table in the optical axis direction.

25           4. The exposure apparatus according to claim 1,

wherein said second sensor includes:

a laser interference measuring apparatus which measures a distance by irradiating a measurement light and interfering the reflected light with a reference light;

a first reflection mirror provided on said projection optical system; and

a second reflection mirror provided on the substrate table.

5. The exposure apparatus according to claim 4, wherein an opening for the measurement light irradiated from said laser interference measuring apparatus and a reflected light reflected on said first reflection mirror to transmit is provided on said substrate table.

6. An exposure apparatus which transfers a pattern image formed on a mask through a projection optical system, comprising:

a substrate table which holds said substrate;

a position measuring system which measures a position of said substrate surface held by said substrate table in an optical axis direction of said projection optical system;

a moving system which moves said substrate table in the optical axis direction based on a

measurement result by the position measuring system;  
and

5 a correction system which measures a change of  
a distance between said projection optical system and  
said substrate table in said optical axis direction  
and corrects a position adjustment of said substrate  
in said optical axis direction using said position  
measurement system and said moving system.

10 7. The exposure apparatus according to claim 6,  
wherein the change of the distance between said  
projection optical system and said substrate table is  
measured in a state where said substrate table is  
positioned at a predetermined position within a  
surface perpendicularly intersecting with respect to  
15 said optical axis direction.

20 8. The exposure apparatus as set forth in claim 7,  
wherein said correction system comprises a reference  
plate having an almost flat surface on said substrate  
table, and when said substrate table is positioned at  
said predetermined position, the position of said  
optical axis direction of said reference plate surface  
is able to be measured by said position measuring  
system:

25 9. The exposure apparatus according to claim 6,  
wherein said correction system comprises a sensor

which measures a distance between a first reference surface of said projection optical system and a second reference surface of said substrate table to measure a change of a distance between said projection optical system and said substrate table.

10. The exposure apparatus according to claim 9, wherein said first reference surface and said second reference surface are flat mirror, and said sensor is an interferometer.

11. The exposure apparatus according to claim 6, wherein an inclined state of said substrate table is always the same when measuring a distance between said projection optical system and said substrate table in said optical axis direction.

12. An exposure apparatus which transfers a pattern image formed on a mask on to a substrate through a projection optical system, comprising:  
a substrate table which holds said substrate;  
a position measuring system which measures a position of said substrate surface held by said substrate table in an optical axis direction of said projection optical system;

a moving system which moves said substrate table in the optical axis direction based on a measurement result by the position measuring system;

and

a correction system which measures a change of  
a distance between said position measuring system and  
said substrate table in said optical axis direction  
5 and corrects a position adjustment of said substrate  
in said optical axis direction using said position  
measuring system and said moving system.

13. A method of producing devices including  
exposure processing of a substrate using the exposure  
apparatus according to claim 1.

14. A method of producing devices including  
exposure processing of a substrate using the exposure  
apparatus according to claim 6.

15. A method of producing devices including  
exposure processing of a substrate using the exposure  
apparatus according to claim 12.